




UTAH

Solid Waste Management Plan

Utah Solid & Hazardous Waste Control Board
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CHAPTER I	1
<i>INTRODUCTION</i>	1
LEGISLATIVE BACKGROUND	1
MANDATED SOLID WASTE MANAGEMENT PLANNING	2
SUBTITLE D	3
 <i>SOLID WASTE GENERATION</i>	 5
RESIDENTIAL AND COMMERCIAL WASTE	5
INDUSTRIAL WASTE	7
NONRESIDENT WASTE	9
IMPORTED AND EXPORTED SOLID WASTE	11
MEDICAL WASTE	12
TOTAL SOLID WASTE GENERATED	13
 SOLID WASTE MANAGEMENT FACILITIES	 15
SOLID WASTE DISPOSAL FACILITIES	15
<i>MUNICIPAL SOLID WASTE LANDFILLS</i>	16
<i>CONSTRUCTION/DEMOLITION LANDFILLS</i>	17
SPECIFIC WASTE DISPOSAL FACILITIES	17
MUNICIPAL SOLID WASTE INCINERATORS	18
COLLECTION SYSTEMS	18
COMPOSTING FACILITIES	20
RECYCLING FACILITIES	21
<i>FERROUS METALS</i>	22
<i>PAPER</i>	23
<i>NONFERROUS METALS</i>	23
<i>GLASS</i>	24
<i>PLASTIC</i>	24
<i>OTHER RECYCLED ITEMS</i>	24
<i>USED OIL</i>	25
 COST ANALYSIS	 26
OF PUBLIC SOLID WASTE DISPOSAL FACILITIES	26
LANDFILL DISPOSAL COSTS	26
INCINERATION DISPOSAL COSTS	29
 REMAINING DISPOSAL CAPACITY	 30
 PLANNING RECOMMENDATIONS	 34
RECOMMENDATIONS SUMMARY	34
<i>SOURCE REDUCTION</i>	35
<i>RECYCLING</i>	35
COMPOSTING	40
<i>LANDFILLING</i>	41
 STATE SOLID WASTE MANAGEMENT STRATEGY	 45

CHAPTER I

INTRODUCTION

Solid waste management in Utah is in a dynamic state of change as a result of new regulatory mandates and public concerns for protection of environmental resources. New landfills are being proposed, many landfills are closing, waste reduction and recycling efforts are multiplying, and local governments are combining resources at a regional level to address solid waste management issues.

This dynamic environment has made solid waste planning more difficult and has highlighted the fact that the state solid waste management plan must also be a dynamic document. It is anticipated that the plan will need to be updated prior to the minimum mandate of every five years.

LEGISLATIVE BACKGROUND

Solid waste management has been a state and local program for 40 years. Before 1965, the main focus was responding to inquiries or complaints about garbage storage, collection, and disposal. There were no state or federal regulations controlling the collection or disposal of solid wastes unless a health hazard existed. During this period, sanitary landfilling was the recommended method of disposal and some progress was made in encouraging communities to adopt this practice.

In 1965, the U.S. Congress passed the *Solid Waste Disposal Act*. Guidelines were issued by the EPA on thermal processing and land disposal of solid waste, materials recovery, resource recovery other facilities, beverage containers, and other subjects. These guidelines applied to federal facilities, facilities on federal land, and, in some cases, recipients of federal grants and contracts. The law provided a program of demonstration grants to states for planning purposes.

In 1968, Utah made an initial survey of community disposal sites and solid waste management practices. The survey indicated that state regulations were needed to provide a uniform method for solid waste disposal. This resulted in the *Utah Solid Waste Disposal Regulations* being adopted in August 1974.

In 1976, Congress passed the *Resource Conservation and Recovery Act* (RCRA). A shift in emphasis from solid waste management to the regulation of hazardous waste began with the passage of RCRA. In 1980, Utah promulgated hazardous waste disposal regulations. From 1971 to 1980, the State received federal grant money to fund the solid waste programs, but after 1980 this funding ended and federal funding was designated instead for hazardous waste programs. During the period from 1980 to 1990, the State conducted only minimal solid waste permitting activities and performed no routine inspections.

During the 1980's some counties, municipal governments, and local health departments initiated development of regulations and management programs for solid waste. Construction and operation of the Davis County waste-to-energy facility, construction and operation of a new landfill in Utah County which meets the new federal standards, the 1989 promulgation of the Salt Lake County regulations governing solid waste management facilities, and the promulgation of infectious waste regulations in Davis and Salt Lake counties are examples of local efforts to exercise proper management of solid waste.

Since 1989, the trend toward greater regulatory control of solid waste management has been evident in the legislation enacted by the Utah Legislature and the associated administrative rule changes, including:

- The 1989 revision to the *Solid Waste Permitting and Management Rules*, R315-301 UAC, requires permits for solid waste incineration facilities, specified operation requirements for these facilities, and detailed plan approval procedures.
- The *1990 Waste Management Amendments* modifies 19-6-104 UCA and 17-15-23 UCA to establish a solid waste management fee for commercial nonhazardous solid waste facilities and prohibit the construction of commercial nonhazardous solid waste facilities without approval from the Solid & Hazardous Waste Control Board, local government, the Governor, and Legislature. The bill also requires the development of county and state solid waste management plans.
- The *1990 Waste Tire Recycling Act*, 26-32a-101 UCA, attempts to promote a market for used tires and imposed a recycling fee to be paid by consumers when purchasing new tires. The fees are deposited into a trust fund to provide a subsidy to qualified recyclers of tires with up to \$20 per ton of tires recycled.
- The *1990 Paper Procurement & Recycling Act*, 63-56-20.7 UCA, requires a minimum percentage of recycled paper to be purchased by the State. Additionally, each state agency is required to evaluate the potential for paper recycling; if the cost of recycling is no more than 10% greater than the current disposal, then the agency is required to recycle.

Chapter I

- The *1991 Lead Acid Battery Act*, 19-6-601 UCA, prohibits the disposal of lead acid batteries in any solid waste disposal facility and requires sellers of lead acid batteries to accept a used lead acid battery for recycling when a new battery is purchased.
- The *1993 Used Oil Management Act*, 19-6-701 through 723 UCA, significantly changes the used oil program in Utah. The existing used oil program was transferred from the Division of Oil, Gas, and Mining to the Division of Solid and Hazardous Waste. The Legislature also incorporated new standards for the collection, reuse, and recycling of used oil. These new statutory provisions correspond to the new standards which the EPA promulgated on September 10, 1992.
- The 1993 amendments to the Waste Tire Recycling Act gives local health departments and the Division of Solid and Hazardous Waste responsibilities regarding waste tire transportation, storage, recycling and disposal. In brief, the amount of reimbursement tire recyclers are eligible for was raised from \$20 to \$65 per ton of waste tires recycled. Waste tire transporters are required to register with the Division of Solid and Hazardous Waste. Waste tire transporters are banned from disposing of most tires at a landfill unless a tire recycler is not reasonable available.

In 1988, the EPA proposed new regulations affecting all landfills which receive municipal solid waste for disposal. These proposed regulations covered six aspects of landfill operations: (1) location, (2) operation, (3) design, (4) groundwater monitoring and corrective action, (5) closure and post closure care, and (6) financial assurance. Although only proposed rules, clearly these regulations would have significant impact on the management of solid waste in Utah.

MANDATED SOLID WASTE MANAGEMENT PLANNING

In 1990, the Utah Legislature recognized the changing regulatory environment of solid waste management. To help prepare counties and the state for these changes, the 1990 Legislature mandated that each county and the state develop a solid waste management plan. To aid counties in the development costs of their plans, the Legislature appropriated \$400,000 to be distributed among the counties. It should be noted that the solid waste management plans developed by the counties and state are required to address the nonhazardous solid waste within the state. Following is a summary of the planning requirements.

Each county or entity designated by the county is required to develop a solid waste management plan that shall:

- Address the solid waste management needs of the next 20 years;
- Estimate the solid waste disposal capacity needed for the next 20 years and include the county's program to ensure sufficient capacity for the next 20 years;
- Provide other information as reasonably required by the Solid & Hazardous Waste Control Board;
- Be submitted to the Solid & Hazardous Waste Control Board on or before June 1, 1993;
- Be reviewed and modified no less frequently than every 5 years.

The state solid waste management plan shall:

- Incorporate the solid waste management plans submitted by the counties or designated entity;
- Determine the type and tonnage of solid waste disposed of within the state;
- Evaluate facility siting, design, and operation;
- Estimate the existing solid waste disposal capacity and the solid waste disposal capacity needed for the next 20 years;
- Assess the State's ability to minimize waste and recycle;
- Evaluate solid waste treatment, storage, and disposal options, as well as solid waste needs;
- Consider concerns that are appropriate for the preservation of public health and the environment;
- Consider the economic viability of management strategies prior to incorporation into the plan and consider the needs of population centers;

- Be completed by January 1, 1994 with periodic review and modification to be conducted no less frequently than every 5 years.

Typically, bills enacted by the Legislature do not provide every detail necessary to implement the statute. The state agency and governing board, designated by the Legislature, is given the responsibility of providing the details, standards, and procedures to effectively implement the legislative mandate and intent. This responsibility is filled through administrative rulemaking. The *County Solid Waste Planning Rule*, R315-350 UAC, was adopted to implement the county solid waste planning mandated by the Legislature. The counties have the responsibility to fulfill the requirements of *County Solid Waste Planning Rule*.

Guidelines are another tool to implement legislative mandates. Guidelines may provide additional information or examples to help implement administrative rules. The *County Solid Waste Planning Guidelines* provide additional information and an expanded discussion of solid waste planning to aid counties in the completion of their solid waste management plans.

SUBTITLE D

Several factors influenced the planning decision contained in the counties solid waste management plans. Perhaps the most significant factor has been the finalization of the federal Subtitle D regulations and the modifications of the *Utah Solid Waste Permitting and Management Rules* which gave the Utah authorization to implement the new regulations. On September 11, 1991 the federal Subtitle D regulations were signed. In general, the regulations applied to all publicly or privately owned/operated landfills that received municipal solid waste after October 9, 1993. Although the federal rule had been "proposed" since 1988, they became final as most counties were initiating their planning efforts.

Almost all aspects of landfill operations were affected by the new regulations. In particular, the small landfills which receive less than 20 tons of waste a day were greatly impacted by the new rules. To ease implementation of the new rules, the EPA provided an exemption from groundwater monitoring and liner requirements for those small landfills in which the following conditions could be met:

- The landfill has no evidence of groundwater contamination;
- The landfill is located in an area that receives less than 25 inches of precipitation per year;
- The community has no feasible waste management alternatives.

Most of the approximately 100 public landfills in the state are small landfills. This exemption could provide significant operational cost savings and was welcomed by most small landfill operations.

In addition, the federal Subtitle D regulations provide some program flexibility for states that assumed authorization to implement the new standards. The Solid and Hazardous Waste Control Board, decided to pursue authorization by modifying the *Utah Solid Waste Permitting and Management Rules*. On July 14, 1993, the Board adopted final changes to the state rules to reflect the federal rules. State authorization to implement the new standards was granted by the EPA on October 8, 1993.

Just as many counties were finalizing their 20-year solid waste management plans, the rules changed for the small landfill operators. On May 7, 1993, the U.S. Court of Appeals for the District of Columbia issued a decision directing the EPA to remove the groundwater monitoring exemption for small landfills. To mitigate the impact of the court ruling, the EPA on October 1, 1993, extended the effective date of the Subtitle D rules for landfills receiving less than 100 tons per day. The general effective date was extended two years to October 9, 1995, for landfills receiving less than 20 tons per day. The general effective date was extended six months to April 9, 1994, for landfills receiving less than 100 tons but more than 20 tons per day. The *Utah Solid Waste Permitting and Management Rules* were changed to reflect the federal changes.

As a result of these rule changes, extended effective dates, and ongoing dialogue between local communities searching for solid waste management alternatives, many counties are still in the process of defining long term solutions to meet the more stringent landfill rules.

The development of the state solid waste management plan was completed concurrent with the changing structure of local solid waste management systems. However, the following key points are incorporated into the state plan.

- At a minimum, the plan must fulfill the planning requirements prescribed by the *Solid and Hazardous Waste Act*, 19-6-101 through 193 UAC.
- The foundation for the state plan will be the information and direction provided by the 29 county solid waste management plans.
- A major accomplishment of the plan will be the compilation of solid waste management information from across the state.

Chapter II

- The state plan, like the county plans, is a dynamic document and should not be expected to provide complete or final solution to all issues, problems, or concerns. Rather, the plans should qualify and quantify specific issues, problems, needs, identified in the county plans and should recommend action to begin to resolve them.

CHAPTER II

SOLID WASTE GENERATION

The type and composition of the solid waste generated by individual states can vary greatly. This variation is a function of several factors including climatic conditions, population characteristics, type of industries and businesses located within the state, landownership, culture, and others. This chapter will describe the types and quantities of solid waste generated within Utah.

Reliable estimates of the solid waste being generated is a crucial component of any solid waste plan. Estimates of current generation rates provide a snapshot view of present conditions and form the foundation for future estimates and related projections. These projections determine the expected life of facilities, future operation costs and revenues, and ultimately the selection of the integrated solid waste management system to be used.

County	R/C SW Generated	% of Total R/C SW Generated	County	R/C SW Generated	% of Total R/C SW Generated
Salt Lake	1,176,200	60.4%	San Juan	9,280	0.48%
Weber	221,769	11.39%	Millard	8,336	0.43%
Davis	168,973	8.68%	Wasatch	7,884	0.40%
Utah	81,792	4.20%	Emery	7,679	0.39%
Cache	60,114	3.09%	Grand	4,929	0.25%
Washington	30,746	1.58%	Morgan	4,807	0.25%
Box Elder	27,440	1.41%	Juab	4,318	0.22%
Iron	21,362	1.10%	Kane	4,013	0.21%
Tooele	20,103	1.03%	Beaver	3,617	0.19%
Uintah	15,592	0.80%	Garfield	2,958	0.15%
Carbon	14,766	0.76%	Rich	1,733	0.09%
Summit	12,403	0.64%	Wayne	1,618	0.08%
Sanpete	12,267	0.63%	Piute	928	0.05%
Sevier	11,592	0.60%	Daggett	517	0.03%
Duchesne	9,562	0.49%	Total	1,947,298	100%

TABLE 2.2: Residential/Commercial Solid Waste Generation by County

The *County Solid Waste Planning Rule* did not require counties to conduct waste characterization studies to determine the composition of the residential/commercial waste stream. However, the EPA's *Characterization of Municipal Solid Waste in the United States: 1992 Update* provides discarded municipal solid waste composition information. The composition of the nation's MSW may provide insight to Utah's residential/commercial waste stream.

Municipal solid waste, as defined by the EPA, includes wastes such as durable goods, nondurable goods, containers and packaging, food scraps, yard trimmings, and miscellaneous inorganic wastes from residential, commercial, institutional, and industrial sources. Examples of waste from these categories include appliances, newspapers, clothing, boxes, disposable tableware, office and classroom paper, wood pallets, and cafeteria wastes. MSW does not include wastes from other sources, such as construction/demolition wastes, municipal sludges, combustion ash, and industrial process wastes that might also be disposed of in municipal waste landfills or incinerators.

The EPA document defines waste discards as municipal solid waste remaining after recovery for recycling and composting. These discards are usually incinerated or disposed in landfills, although some MSW is littered, stored, or disposed of on-site, particularly in rural areas.

Waste Categories	1990 Discards (mil tons)	Weight (% of MSW total)	Volume (% of MSW total)
Paper & Paperboard	52.4	32.3%	31.9%
Plastics	15.9	9.8%	21.1%
Yard Trimmings	30.8	19.0%	9.8%
Ferrous Metals	10.4	6.4%	8.9%
Rubber & Leather	4.4	2.7%	6.1%
Textiles	5.3	3.3%	6.4%
Wood	11.9	7.3%	6.8%
Food Wastes	13.2	8.1%	3.2%
Other	5.7	3.5%	1.4%
Aluminum	1.6	1.0%	2.2%
Glass	10.6	6.5%	9.3%
Totals	162.3	100%	100%

TABLE 2.3: Volume of Materials Discarded in the United States MSW, 1990

INDUSTRIAL WASTE

Industrial solid waste results from an industry or commercial process, including businesses associated with manufacturing, mining, construction, transportation, communications, public utilities, and wholesale trade. Unlike residential and commercial solid waste, industrial solid waste generation rates can vary greatly from county to county and from state to state. This local variance prohibits the use of any standardized figures.

Accordingly, the county solid waste management plans were to include a survey of industrial waste that is disposed or has a reasonable potential to be disposed at a public or commercial disposal facility. The goal of the surveys were to:

- Provide an estimate of the tonnage of industrial waste disposed by landfilling, by incineration, and by any other disposal method during the 1992 calendar year;
- Determine the approximate composition of the industrial generated solid waste during the 1992 calendar year;
- Determine the disposal destinations of the industrial solid waste generated during the 1992 calendar year.

To obtain estimates of industrial waste generated, one of two survey methods were typically conducted. One survey method involved conducting either a mail or telephone survey of the industries listed in the *Utah Directory of Business and Industry 1992-1993*. The other method relied on information provided by commercial and public waste haulers. Both methods provided challenges that made accurate measurements of industrial solid waste difficult.

Telephone and mail surveys of individual industries presented the following problems:

- Low survey response rate;
- Inaccurate or incomplete survey responses;
- Industries typically subscribed to collection services which did not necessitate the industry to measure its waste generated.

Survey of commercial and public haulers revealed another difficulty:

- Commercial and public haulers define and measure waste by the collection device (i.e., dumpsters or roll off containers) rather than by type of waste;
- Some commercial haulers viewed specific information relating to tonnages and type of waste collected a proprietary business information.

The most representative industrial waste survey appears to be those surveys based on information provided by commercial and public haulers.

It is estimated that 346,407 tons of industrial waste was generated in Utah in 1992. This estimate does not include some large volume industrial waste such as mine tailings, cement kiln dust, and coal fired power plant waste. Of the total industrial waste generated, 58% was generated in Salt Lake and Utah County. Both counties relied on industrial waste estimates obtained from commercial and public haulers. National and other states statistics indicate the amount of industrial solid waste generated should exceed the amount of MSW generated in Utah.

County	Industrial Waste (tons)	% of Total Industrial SW	County	Industrial Waste (tons)	% of Total Industrial SW
Utah	101,785	29.41%	Millard	867	0.25%
Salt Lake	98,000	28.29%	Wasatch	755	0.22%
Weber	58,176	16.79%	Juab	93	0.03%
Cache	21,319	6.15%	Beaver	78	0.02%
Box Elder	18,140	5.24%	San Juan	30	0.01%
Washington	10,400	3.00%	Grand	30	0.01%
Sevier	8,280	2.39%	Kane	10	0.00%
Uintah	7,087	2.05%	Garfield	0	0.00%
Summit	6,084	1.76%	Rich	0	0.00%
Tooele	4,014	1.16%	Wayne	0	0.00%
Emery	3,750	1.08%	Piute	0	0.00%
Carbon	2,541	0.73%	Daggett	0	0.00%
Iron	2,002	0.58%	Davis	Unknown	-
Sanpete	1,533	0.44%	Morgan	Unknown	-
Duchesne	1,343	0.39%	Total	346,407	100%

TABLE 2.4: 1992 Industrial Solid Waste Generated by County

Due to the difficulties the counties had with the industrial survey estimates, a representative composition analysis of the total industrial waste cannot be provided.

NONRESIDENT WASTE

In some planning areas across the state, a significant amount of solid waste is generated by visitors, vacationers, military personnel, seasonal workers, and other nonresidents. Accordingly, the county plans were to provide estimates of the tonnage of solid waste generated on state, federal, private, recreational lands, municipalities, or other areas accommodating large nonresident populations. Nonresident solid waste generation can vary greatly based on service and function of the facilities provided. Counties were encouraged to use records from local facilities, local chamber of commerce information, and transient room tax figures.

The measurement of nonresident generated solid waste suffered the same difficulties as the other categories of solid waste. Solid waste management systems do not measure waste by this category. Almost all of the county tonnage estimates for nonresident waste were based on general information provided by the local chamber of commerce. However, the county plans identified 40,807 tons of solid waste generated by nonresidents in 1992. Salt Lake, Davis, Morgan, and Iron counties were unable to provide reliable statistics on nonresident waste. For those counties, the nonresident generated solid waste is included in their estimates of residential/commercial solid waste.

The *1993 Economic & Tourism Profiles for Utah Counties*, contains information which further illustrates the impact of nonresident waste generation, particularly in rural Utah. Table 2.6 shows the 1992 visitation rates at some of Utah's most popular recreation areas.

County	Tons Non-Resident Waste	County	Tons Non-Resident Waste
Tooele	17,000	Emery	620
Kane	4,156	Beaver	401
Washington	2,762	Uintah	271
Garfield	2,703	Sevier	237
Box Elder	2,470	Millard	169
Summit	1,601	Piute	127
Duchesne	1,177	Juab	109
Grand	1,142	Carbon	84
Daggett	1,040	Cache	48
Weber	905	Sanpete	3
Wayne	894	Salt Lake	Unknown
San Juan	816	Iron	Unknown
Rich	730	Davis	Unknown
Utah	672	Morgan	Unknown
Wasatch	670	Total	40,807

TABLE 2.5: 1992 Nonresident SW Generated

Recreation Area	1992 Visitation	Recreation Area	1992 Visitation
Glen Canyon N.R.A.	3,588,000	Capitol Reef N.P.	688,000
Flaming Gorge N.R.A.	2,600,000	Cedar Breaks N.M.	558,000
Zion N.P.	2,391,000	Canyonlands N.P.	396,000
Bryce Canyon N.P.	1,018,000	Dinosaur N.M.	480,000
Arches N.P.	800,000		

Table 2.6: 1992 Visitation Rates to Utah Recreation Areas

IMPORTED AND EXPORTED SOLID WASTE

Solid waste disposal patterns change as disposal facilities close, new facilities open, costs change, and new solid waste management restrictions, modifications, or laws are implemented. These changes significantly affect the

amount of solid waste being exported or imported across municipal, county, and state boundaries and may significantly affect the life span of existing facilities.

Counties were asked to estimate the tonnage of residential/commercial solid waste and industrial solid waste imported into the county or exported outside the county. In theory, each unit of solid waste crossing the planning area boundaries is measured twice. One county measures the waste crossing its border to determine its imports while another measures may measure a portion of that same waste to determine its exports. If each county utilized the same measuring technique, export tonnages should equal imported tonnages. Waste imported from out-of-state was calculated separately.

County	Imported R/C in tons	Disposal Facility	Origin of Waste
Salt Lake	13,000	Not Identified	Mostly C/D waste from Wasatch Front area
Duchesne	8,320	Duchesne Co. Landfill	Wasatch Co.
Davis	4,702	Davis Co.	Weber Co.
	5,701	Davis Co.	Morgan Co.
Utah	2,700	Wayman Tire Landfill	Wasatch Front Area
	1,018	BFI Medical Incinerator	Weber Co.
Garfield	564	Garfield Co. Landfill & Ticaboo Landfill	Glen Canyon N.R.A. & Kodachrome S.P. in Kane Co.
Sevier	485	Sevier Co. Landfill	Fish Lake and Capitol Reef N.P. in Wayne Co.
Sanpete	243	Sanpete Co. Landfill	City of Redmont in Sevier Co.
Grand	135	Moab City Landfill	Canyonlands N.P. in San Juan Co.
Emery	92	Green River Landfill	Grand Co. side of City of Green River
Washington	10	Washington Co. Landfill	Tires from Iron Co.
Millard	8	Millard Co. Landfill	Little Sahara S.P. in Juab Co.
Iron	5	Smith Pit Landfill	Asbestos from Garfield and Beaver Co.'s
Total	36,982		

TABLE 2.7: 1992 Imported R/C Solid Waste by County

Review of the information, provided by the counties, suggests that imported wastes more accurately reflects the waste movement between planning areas. Waste is most accurately measured at the disposal site rather than where it is generated. Typically, the waste is weighed or measured at the disposal site to determine appropriate disposal fees. For this reason, the plan will primarily rely on imported waste measurements when reviewing the movement of waste across county boundaries. Table 2.7 lists imported waste by county. Counties not listed reported zero imported waste.

County	Imported Industrial Waste in Tons	Disposal Facility	Origin of Waste
Carbon	77,431	ECDC	80% out of state
Tooele	52,607	USPCI	98% out of state
Salt Lake	12,000	E.T. Technologies	Not provided
Millard	247	Millard County Landfill	Ashgrove Cement, Juab County
Total	89,678		

TABLE 2.8: 1992 Industrial Waste Imported by County

County	SW Exported Out-of-State (tons)	Type of Waste	Disposal Location
Kane	2,578	R/C	Landfill in Page, Arizona
Washington	986	R/C	Hildale waste sent to Colorado City, Arizona
Utah	118	Medical	Incineration in unidentified state
Juab	?		
Tooele	?		
TOTAL	3,682		

TABLE 2.9: 1992 Utah Waste Exported Out-of-State

Of the total 179,267 tons of solid waste crossing county and state boundaries for disposal, approximately 79% of the waste was disposed at commercial facilities.

MEDICAL WASTE

Medical facilities such as hospitals, dental offices, and veterinary facilities produce infectious waste which have the potential to transmit disease. To be capable of transmitting infection, a waste must contain a pathogenic agent in a large enough quantity to cause infection; a susceptible host (individual) must come in contact with the infectious agent; and there must be a portal of entry through which a sufficient number of organisms is deposited to cause infection.

The Public Health Implications of Medical Waste: A Report to Congress (September, 1990) indicates that while there are many injuries resulting from sharps, the infectious nature of the waste seems minimal since the report found only one infection associated with the management of medical waste. The greatest risk of injury resulting in infection is associated with the medical waste nearest the point of origin. Due to recent publicity, however, the public may perceive that all medical waste poses a serious health threat.

Few communities have a detailed understanding of the quantities of infectious waste generated or where the waste is disposed. To provide some basic information, counties were to survey the major medical facilities (20

or more employees) to determine the tonnage of infectious waste generated and where it was disposed. The results of the survey are provided in Table 2.10 below.

Disposal Method	# of Facilities	% of Total Facilities	Tons Disposed	% of Total Medical Waste
On-site (incineration)	23	8	358	38
Off-site (Landfill or Incineration)	260	82	572	62
Total	283	100	930	100

TABLE 2.10: 1992 Medical Waste Disposal by Major Medical Facilities

The survey indicates that only the larger generators of medical waste operate on-site disposal through incineration. Following the incineration of the medical waste, the non-infectious ashes is landfilled.

TOTAL SOLID WASTE GENERATED

The *County Solid Waste Planning Rule* required the counties to quantify the amount of residential/commercial, industrial, and nonresident solid waste generated. Most counties simply totaled the three waste categories measured. The remaining 11 counties utilized a variety of methodologies to determine total solid waste generated. The county plans indicate that 85% of the total waste stream is comprised of the three categories of waste measured. The remaining 15% of the waste is labeled as "other" in Table 2.11. The "other" SW category is waste generated in Salt Lake County and Utah County which is diverted (not disposed) through recycling, composting, and soil regeneration. A more detail discussion of recycling is provided in Chapter 3.

SW Category	Tons Generated	% of Total SW
Residential/Commercial	1,947,298	70.6
Industrial	346,407	12.5
Non-resident	40,807	1.5
Other (recycled)	425,153	15.4
Total	2,759,665	100

TABLE 2.11: 1992 Total SW Generated by Waste Type

County	Total SW (tons)	% of Total State SW	County	Total SW (tons)	% of Total State SW
Salt Lake	1,614,000	58.49%	Emery	12,049	0.44%
Weber	279,855	10.14%	San Juan	10,126	0.37%
Utah	263,403	9.54%	Millard	10,070	0.36%
Davis	168,973	6.12%	Kane	8,179	0.30%
Cache	81,481	2.95%	Wasatch	7,884	0.29%

Box Elder	48,050	1.74%	Garfield	6,225	0.23%
Washington	43,908	1.59%	Grand	6,214	0.23%
Tooele	41,117	1.49%	Morgan	4,807	0.17%
Summit	27,070	0.28%	Juab	4,318	0.16%
Iron	23,364	0.85%	Beaver	4,233	0.15%
Uintah	22,679	0.82%	Wayne	2,512	0.09%
Sevier	20,190	0.73%	Rich	2,463	0.09%
Carbon	17,391	0.63%	Daggett	1,557	0.06%
Sanpete	14,410	0.52%	Piute	1,055	0.04%
Duchesne	12,082	0.44%	Total	2,759,665	100%

TABLE 2.12: 1992 Total Solid Waste Generated by County

CHAPTER III

SOLID WASTE MANAGEMENT FACILITIES

Solid waste management planning is an ongoing process. Accurate assessment of existing facilities is crucial for current decision making as well as future planning. This is particularly true as many small landfills decide whether to stay open or close to participate in a regional site. A detailed review of existing facilities may identify potential or under utilized resources. The county solid waste plans included an inventory of existing public and commercial solid waste management facilities. This chapter will summarize those inventories.

SOLID WASTE DISPOSAL FACILITIES

While Utah continues to emphasize waste reduction and a more integrated approach to solid waste management, landfilling will continue to be the dominant method of waste disposal. Table 3.1 indicates the critical role of landfilling in Utah's solid waste management system.

Ownership is cataloged as either public or private. Public facilities are those facilities owned by a recognized jurisdiction of government whether a city, county, or special service district. Private are those facilities owned by corporations, partnerships, or private individuals.

Facility Type	Total by Ownership		
	Total #	# Public	# Private
MSW Landfills	93	91	2
Specific Waste Facilities	17	5	12
C/D Landfills	6	0	6
MSW Incinerators	1	1	0
Total	117	97	20

TABLE 3.1: 1992 Disposal Facilities Type

To obtain an overview of solid waste (SW) disposal in Utah, four facility types are utilized. Municipal Solid Waste (MSW) landfills are facilities that may dispose of household waste, commercial waste, industrial wastes and other waste. However, their distinguishing characteristic is that they primarily dispose of household waste. Construction/Demolition (C/D) landfills are facilities that primarily dispose of waste materials including building materials, packaging, and rubble resulting from construction, remodeling, repair, and demolition operations on pavements, houses, commercial buildings and other structures. Specific waste facilities are those facilities that dispose of a specific waste type or waste generated by a specific facility. These facilities include bulky waste landfills, private on-site landfills, monofills, and sludge disposal facilities. A MSW incinerator is a facility that primarily receives household waste and utilizes a controlled disposal process by which combustible solid wastes are changed and altered to noncombustible gases and other noncombustible residues.

A short discussion of each type facility and its relationship to overall state solid waste systems follows.

MUNICIPAL SOLID WASTE LANDFILLS

Chapter III

In 1977 and 1978, the Bureau of Solid Waste Management conducted a statewide inventory of solid waste disposal sites. Approximately, 200 municipal, state, and federal solid waste disposal sites were identified. These waste disposal sites were the primary disposal area for waste materials discarded by Utah's population.

In 1992, the county solid waste management plans identified 93 MSW landfills. All but two facilities were public facilities. The two private MSW landfills were the Sanpete Valley Waste Disposal Landfill and the East Carbon Development Corporation Landfill. Both private facilities may accept other waste streams in addition to MSW waste. However, the facilities were classified as MSW landfills for planning purposes.

The significant reduction in the number of MSW landfills between 1978 and 1992 was primarily due to the closure of many small community landfills. However, the vast majority of landfills in Utah are still small landfills as indicated in the Table 3.2 . The reduction in the number of small landfills will continue. The county solid waste plans indicate that fewer than 30 of the existing landfills will remain open by the end of 1995.

Landfill Size (in tons per day)	# of Landfills
0-20 (Small)	72
20-100 (Medium)	12
100 + (Large)	9
Total	93

TABLE 3.2: 1992 MSW Landfills by Size

The county MSW landfill inventories reported that approximately 1,835,416 tons of solid waste was disposed at the 93 landfills. Table 3.3 indicates that 10% of the state's landfills disposed of 79% of the states MSW. The total waste disposed at small landfills is underestimated because 16 of the small landfills were unable to provide estimates for waste disposed in 1992.

Landfill Size (by disposal rate in tons per day)	# of MSW Landfills	Waste Disposed (in tons)	% of Total Waste Disposed in MSW Landfills
100+ (Large)	9	1,461,144	79%
20-100 (Medium)	12	233,834	13%
0-20 (Small)	72	140,438	8%
Total	93	1,835,416	100%

TABLE 3.3: 1992 Waste Disposal by MSW Landfills

In 1992, the two private MSW landfills disposed of less than 1% of the MSW generated in Utah. That percentage is expected to increase to 6% in 1994 after Carbon County and Utah County's Solid Waste Special Service District begin transporting solid waste to the ECDC Landfill for disposal.

CONSTRUCTION/DEMOLITION LANDFILLS

Solid Waste Management Facilities

All of the C/D landfills inventoried in the county plans, are private operations. In 1992, the C/D landfills disposed of approximately 470,000 tons of waste or 17% of the total SW generated in Utah.

SPECIFIC WASTE DISPOSAL FACILITIES

Although these disposal facilities are designed to handle specific waste streams, their functions vary greatly. Table 3.4 provides an overview of the type of facilities.

Process specific waste facilities can be characterized as landfills which dispose of waste from a particular process. Of the eight landfills in this category, seven are private landfills disposing of industrial waste generated on-site. Additional private on-site landfills exist in Utah but were not included in the county solid waste planning inventory.

Private on-site landfills are not currently regulated by the *Solid Waste Permitting and Management Rules*. The *County Solid Waste Planning Rule* required the inventory of public and commercial disposal facilities and encourage the participation of private on-site landfills in the inventory process.

Single waste facilities accept one specific type of waste that may be generated either on-site or off-site. The four disposal facilities in this category include, a waste water sludge monofill, wastewater sludge landspreading, a dead animal landfill, and a waste tire landfill.

Bulky waste facilities are landfills typically located in areas with long hauling distances to a MSW landfill. These facilities typically accept large, bulky, wastes which are difficult and expensive to haul long distances. The bulky waste landfills have less operational requirements than MSW landfills.

The soils regeneration facility accepts a variety of liquid and non-hazardous industrial waste which is blended with dewatered sewage sludge and native soils to produce a nutrient enriched soil to be used as final cover for a MSW landfill.

Nine, of the 16 facilities identified, reported the amount of waste disposed in 1992. The total disposal tonnage of these facilities was 434,480 or 16% of the states solid waste generated.

Facility Type	# of Facilities
Process specific waste	8
Single Waste	5
Bulky Waste	3
Soil Regeneration	1
<i>Total</i>	17

TABLE 3.4: Specific Waste Disposal Facilities

MUNICIPAL SOLID WASTE INCINERATORS

One MSW incinerator is located in Utah. It is an energy recovery facility owned by the Davis County Solid Waste Management and Energy Recovery Special Service District. The facility utilizes a mass burn process to dispose of nonhazardous solid waste. The mass burn process reduces the waste volume by 90%. The

remaining ash is disposed at the District's landfill. In 1992, the facility disposed of 99,430 tons of solid waste or approximately 4% of the total solid waste generated in the state.

COLLECTION SYSTEMS

In most communities and planning areas, collecting solid waste is not a new activity. However, it should be noted that many rural areas have recently spent significant effort and resources to provide collection service to all residents. Most planning areas utilize a mix of public owned and operated collection systems, private contracted services, and private services. Like other areas of solid waste management, collection systems are undergoing rapid change. Many of the new landfills are being sited farther away from population centers which results in higher collection and transportation costs.

The county plans included an inventory of solid waste collection systems. The inventory may be useful in determining if any improvement in efficiencies is possible, and how the current mix of services fits into the integrated solid waste management system. The county solid waste plans revealed factors common to both urban and rural Utah collection systems but these factors impact each area differently. Rural Utah collection system may feel a greater impact of long distances between pick-ups, longer hauling distances, poor road conditions, and general system inefficiencies as a result of the rural demographics. However, central collection points provide improved efficiencies in many settings. Those central collection points may include:

- Drop Boxes (Green Boxes): refer to large mobil containers, typically 6 to 12 cubic yards in size, and strategically placed throughout the planning area. Drop boxes normally serve the general public and receive uncompacted loads from off-site;
- Roll Off Containers: refer to larger mobil containers, typically 20 cubic yards or greater, which are strategically located, and may be equipped with a compactor.
- Transfer Stations: refer to a permanent, fixed, supplemental collection and transportation facilities used by persons and route collection vehicles to deposit collected solid waste from off-site into a larger transfer vehicle for transport to a solid waste handling or disposal facility.

The county plans inventoried both commercial and public solid waste collection systems operating within their planning area. Of the total collection system, 34 public collection operators and 75 commercial collection businesses were identified. Ten commercial collection businesses have operations in multiple counties.

Ownership	#	Tons Collected	Operations not Reporting Tonnages
Public	34	1,038,204	7
Commercial	73	298,752	58
Total	107	1,336,956	65

TABLE 3.5: 1992 Collected SW Tonnage by Ownership

The county plans accurately reflect the total tonnage of waste collected by public collection systems. The seven public collections systems that did not provide tonnages serve approximately 3% of the state's population.

Solid Waste Management Facilities

Collection tonnages are valued as proprietary business information by many commercial operations and this feeling is reflected in the lack of commercial tonnage estimates provided. The true tonnage of solid waste collected by commercial business is expected to be much higher.

Ownership	Collection Tonnage (% of SW generated in Utah)
Public	38
Commercial	11
Total	49

TABLE 3.6: 1992 Percentage of Total SW Collected

The county plans estimate that approximately 78% of the state's population is served by a collection system. The inventory of collection systems indicate that 49% of the estimated 2,759,665 tons of solid waste generated in the state is transported for disposal by public or commercial collection systems.

Centralized collection points are used in the state to aid in the transportation of waste to the disposal facilities. Of the 18 collection points inventoried, 16 of the facilities are publicly owned facilities. The two commercial facilities consist of a medical waste transfer station and a roll-off container used for collection of MSW.

Collection Point Systems	# of Facilities
Roll-off Container	12
Transfer/Compactor	5
Total	18

Table 3.7: Transfer Stations Inventory

Roll-off containers are being used in rural areas for placement of MSW and bulky items to be periodically transported to public landfills. The facilities are typically unmanned and accessible to the public 24 hours a day.

The transfer stations/compactors, with the exception of the medical waste transfer station, serve resident and collection route vehicles as solid waste collection points. The waste is compacted and transported by larger vehicles to landfills for disposal.

COMPOSTING FACILITIES

Composting is the aerobic, microbial degradation of organic waste. Municipal solid waste contains organic materials such as paper, cardboard, food wastes, and yard waste. These wastes can be turned into a humus-like product that physically resembles soil. This product is used as a soil amendment to improve soil's water retention, infiltration, and aeration.

Organic or compostable waste is estimated to represent up to 84% of the nations municipal solid waste, with yard waste representing 18% of the municipal solid waste stream. Many communities, in an attempt to extend the life of their facilities, are evaluating composting as one way to reduce the amount of solid waste entering their landfills. Centralized composting facilities may cost less than other disposal options (typically \$30-\$50 per ton to compost verses, \$50 to \$100 for incineration).

Chapter III

The principal public concern with composting facilities is the potential odor problem associated with improperly managed operations. Composting facilities can reduce or eliminate odor problems through proper pile or windrow management. Any potential surface water or ground water contamination problems can be eliminated through proper site selection, design, and operation.

Heavy metals accumulation in compost materials may be a concern in a composting operation which utilizes MSW or wastewater sludge. The result could be that the final compost product could not be used in food producing applications.

In addition to diverting waste from landfills, composting operation may reduce the amount of leachate and methane gas produced in landfills. Compostable materials are a significant contributor to moisture in landfills and are the source of methane gas in landfills.

The county plans listed five composting facilities in operations during 1992. Three facilities are publicly owned with one commercial and one private operation.

Ownership Type	# of Facility	Materials Accepted	Annual Throughput Capacity (in tons)	Compost Generated	
				Tons	Cubic Yards
Public	3	yard waste, sludge	12,900	3,434	9,193
Non-Profit Private	1	yard waste, agriculture waste	18,000	1,840	4,906
Commercial	1	UNKNOWN	UNKNOWN	222	500
Total	5		30,900	5,496	14,599

TABLE 3.8: 1992 Compost Facility Inventory

Composting is a relatively new activity for public facilities. All three facilities began operations since 1990. The primary source of material accepted at the three public composting operations is yard wastes delivered by citizen and landscaping contractors. One facility utilized a small amount of wastewater treatment sludge in a separate pile or windrow with the compost usage being restricted to landscaping projects. Public compost operations used the final product for city landscaping projects. Demand for the compost is great enough to allow one operation to sell a portion of the compost generated back to the citizens.

The private composting operation is a university that composts yard waste, wood waste, and agriculture waste generated on-site. The compost is used as soil amendment and potting soil for on campus purposes. It is anticipated that the facility will have the capability to accept food waste and hopes to divert up to 80% of its wastes through recycling and composting.

The commercial composting operation accepts yard wastes generated by residents. Final use of the compost product was not provided.

The composting operations were asked to estimate their potential throughput capacity with existing resources. The results indicate that, in total, the composting operations are operating at approximately 17% percent of capacity.

RECYCLING FACILITIES

Although not a new technique, recycling is becoming increasingly popular with the general public and increasingly important as solid waste managers battle the rising costs and environmental impacts of waste disposal. Recycling reduces the amount of solid waste entering the landfills, may reduce the collection and transportation costs of solid waste disposal, and reduces the depletion of resources and energy used in the manufacturing of materials for products.

Recycling is more than collection of post-consumer materials. In addition to collection of used materials, recycling includes the processing and transportation of those materials, the conversion of those materials into useful products through remanufacturing, and the marketing and purchase of those new products. Each of these steps in the recycling process are economically connected. Each step must be present and in balance with each other step if recycling is to occur. Any imbalance, or missing steps may result in the recycling process not being completed.

Type of Recycling Facility	# of Facilities
Commercial	45
Public	4
<i>Total</i>	49

TABLE 3.9: Recycling Facilities by Type

The *County Solid Waste Planning Rule* required each county to provide an inventory of recycling facilities and to provide estimates of the tonnage of recycled materials diverted from the solid waste stream. Most of the recycling facilities (92%) in the state are commercial operations. The specific operation details such as source of materials, final markets, and tonnages of material recycled is considered confidential business information by many commercial recyclers. However, counties approached the recycling businesses with a request for assistance. Through a cooperative effort with the recycling businesses, many counties were able to obtain commodity specific tonnages of materials recycled. Following is a summary of the recycling information provided in the county plans.

Table 3.10 shows that 97% of all the materials recycled in the state was done in three Wasatch Front Counties. However, those same counties generated 58% of Utah's solid waste. This illustrates that densely populated areas, located closer to recycling markets, have an increased opportunity for successful recycling activities.

Table 3.11 shows Sanpete County with the highest recycling rate in the state at 36% of total solid waste generated. Sanpete County's successful recycling rate is a result of scrap iron recycling by a private company which collects and ships 5,000 tons of car bodies and heavy equipment. Statewide 18% of all the solid waste generated was recycled. The 18 counties not included in Table 3.11 were unable to quantify any recycling activities in their county solid waste plans.

The county plans identified 49 recycling facilities in the state. These recycling facilities are comprised of a combination of collection centers, processing centers, and remanufactures. The facilities were estimated to recycle a total of 498,891 tons of materials. Of the 49 recycling facilities identified, 5 drop-off facilities were unable to provide tonnages of recycled materials they received. All 5 drop-off facilities were in rural counties and would likely not have a significant impact in the statewide total of materials recycled.

County	% of Total State Recycling Tonnage
Salt Lake	70
Utah	14
Weber	13
Davis	3
Sanpete	1
Washington	<1
Cache	<1
Uintah	<1
Grand	<1
Duchesne	<1
Summit	<1
Iron	<1
Total	100

TABLE 3.10: 1992 County Recycling as Percentage of State Recycling Total

FERROUS METALS

As illustrated in Table 3.12, 55% of the materials recycled in the state were ferrous metals. Ferrous metals consist mainly of scrap iron and steel. Traditionally, the largest amount of recycled steel has come from large items such as cars and appliances.

Historically, markets for recycling ferrous metals have been well established and are expected to remain so.

PAPER

Paper accounted for the second greatest tonnage of materials recycled with an estimated 95,605 tons recycled in 1993. Old newspaper is the most often recycled portion of the paper recycling stream. Markets for old newspaper have fluctuated as waste paper collection has at times exceeded domestic mill capacity. With additional de-inking facilities coming on-line, markets for old newspaper should be improving. Historically, markets for corrugated paper have been steady and is expected to remain so. Other paper includes high grade paper such as white ledger paper, computer paper, and mix paper. The market for high grade paper has remained strong while the mixed paper market has been weak.

NONFERROUS METALS

Nonferrous metal includes copper, lead, zinc, and aluminum (to be discussed separately). The Salt Lake County Plan reports that 45% of the copper utilized by industry is generated from scrap materials. The EPA reports that lead for lead acid batteries is the most prevalent nonferrous metal (other than aluminum) in the MSW. Nationwide EPA estimated that 96% of battery lead was recovered in 1990.

County	Total Tons Recycled	Recycling Rate (as % of county SW generated)	# of Recycling Facilities
Sanpete	5,180	36	3
Utah	67,323	26	6
Weber	62,987	23	9
Salt Lake	340,100	21	16
Davis	14,460	9	unknown
Washington	3,600	8	1
Uintah	1,400	6	3
Grand	131	2	1
Cache	3,652	2	1
Duchesne	47	<1	on-site recycling
Iron	10	<1	4
Summit	unknown	unknown	2
Tooele	unknown	unknown	2
Wasatch	unknown	unknown	1
Total Statewide	498,891	18	44

ALUMINUM

It requires 95% less energy to produce an aluminum can from an existing can than from ore. As a result, a good, stable market exists for scrap aluminum and aluminum cans. Nationally, 63% of all aluminum cans were recycled in 1990 according to EPA.

TABLE 3.11: 1992 County Recycling Rates

Commercial and industrial sources of aluminum account for 75-80% of the aluminum recycled in Utah.

GLASS

Glass accounted for 7% of the total MSW generated in the United States in 1990. In addition to new glass containers, glass is also used in the manufacture of fiberglass, asphalt, brick and outdoor surfacing products. The principal markets for recycled container glass are the major glass bottle plants in the United States. Generally, recycled glass must be separated in three categories: clear (flint), brown (amber), and green. Rings and caps should be removed at the collection or processing stage because they can cause defects in new glass containers or damage the furnace linings. Glass may be transported either as whole bottles or crushed (cullet). Glass is heavy so transportation costs are critical in judging market availability.

Chapter III

In Utah, glass recycling is primarily limited to the Wasatch Front. Approximately 93% of all glass recycled in Utah is done in Salt Lake County. Salt Lake County reported 4,000 tons of plate glass was recycled into glass beads for highway signs.

PLASTIC

The use of plastic is rapidly growing. In 1960, less than 1% of MSW was plastic. This figure grew to over 8% in 1990. In Utah approximately 95%, or 185 tons, of all plastic recycling occurred in three Wasatch Front Counties. The plastic recovered was primarily comprised of milk and beverage containers.

OTHER RECYCLED ITEMS

This "other items" category of recycled material is used to include material that is not part of the standard recycling commodity groups. Material in this category include, waste at a soil regeneration site, inert material, wood pallets, antifreeze, foam rubber, food waste, sewage sludge, and compost. The largest portion of the 94,391 tons of material recycled in this category is from the soils regeneration facility in Salt Lake County. The soils regeneration facility diverted 64,000 tons of material from the waste stream. The second largest segment in this category was inert materials which diverted 13,000 tons from the waste stream. Approximately 6% of the "Other Items" includes materials counties reported as recycled but did not include a description of the material recycled.

Recycling Commodity	Tons Collected (statewide)	% of Total Recycled Tonnage
Ferrous Metals	271,470	54
Total Paper	96,647	20
Newspaper	(27,616)	(6)
Corrugated	(24,715)	(5)
Other Paper	(44,316)	(9)
Nonferrous Metals	19,101	4
Aluminum	5,342	1
Glass	4,306	<1
Plastic	195	<1
Other Items	100,680	20
Total	498,891	100

TABLE 3.12: Recycling Tonnage by Commodity Type

USED OIL

Used oil management is important in preventing pollution. Used oil is the number one cause of water pollution world wide. One gallon (a single oil change) of used oil can contaminate one million gallons of fresh water. Unfortunately, a large quantity of used oil is improperly disposed in landfills, sewage systems, or dumped on the ground. A significant amount of energy is recovered when used oil is recycled. Refining used oil requires only one-third the energy it takes to refine crude oil to a lubricating quality.

In 1993, the *Utah Used Oil Management Act* was enacted. The Act prohibits the disposal of all recyclable used oil, establishes a recycling fee, provides funds for reimbursement to used oil collection centers, and provides for limitations on certain liabilities for properly operated do-it-yourself used oil collection centers.

Year	Used Oil Recycled in Gallons
1989	3,082,800
1990	3,664,200
1991	4,229,000
1992	4,340,600

In Utah, nearly 10 million gallons of used oil is generated each year. In 1992, approximately 4.34 million gallons of used oil was recycled.

TABLE 3.13: Used Oil Recycling Quantities

Currently, there are approximately 35 used oil collection stations where do-it-yourselfers and agricultural operations can take their used oil for recycling. These collection centers are found at auto stores, auto service centers, gasoline stations, and a municipal landfill. In addition, there are approximately 23 registered used oil collectors and used oil reclaimers.

The quantity of used oil recycled is expected to increase as the used oil program is implemented. Long term, the used oil recycling rate is anticipated to increase to 75%.

CHAPTER IV

COST ANALYSIS OF PUBLIC SOLID WASTE DISPOSAL FACILITIES

Solid waste planning should include the examination of the true or full cost for each segment of the public solid waste management system. This is of particular importance in today's public budgets. Increases in waste disposal costs, equipment costs, wages, and environment standards are causing significant increases in the operating and capital costs of solid waste management.

An understanding of the full cost of municipal solid waste management is crucial to the development of sound planning recommendations, operations, and implementation schedules. Yet, not all solid waste managers are aware of the full cost associated with the management of their wastes. Full cost accounting is complicated by the combination of financing systems used for solid waste management such as tipping fees, resident billing, property tax, general revenue funds, and road department funding. Additionally, future costs may not be accounted for in annual budgets.

Each county plan included an analysis and discussion of the 1992 calendar year capital costs, operating costs, and revenues for each publicly owned or operated solid waste management system. Following is a review of the cost estimates provided in the county plans.

LANDFILL DISPOSAL COSTS

In 1992, it cost public landfills approximately \$21.6 million to dispose of the estimated 1.8 million tons of solid waste. Disposal cost represents the cost of disposing of the solid waste once it has been delivered to the landfill gate. Table 4.1 illustrates how those costs were distributed. Not all the state's public landfills are represented in the table. Approximately 65% of the small landfills were unable to provide cost estimates. One large landfill budget is combined with another type of disposal facility and could not be separated out. Thus, the expenditures for the large and small landfills are underestimated.

Landfill Size (tons per day)	Disposal Cost (Per Ton)	Expenditures
100+ (large)	\$10.68	\$16,917,000
20+ to 100 (medium)	\$11.96	\$3,162,000
0 to 20 (small)	\$14.95	\$1,566,000

TABLE 4.1: 1992 Disposal Costs for Public Landfills

The county plans reflect that the average public landfill disposal cost per ton is well below the May 1993 national average of \$34.39 and is near the regional average of \$13.46 as reported in the *Solid Waste Digest*.

REGIONAL MSW TIPPING FEES

FOR COMMERCIAL HAULERS

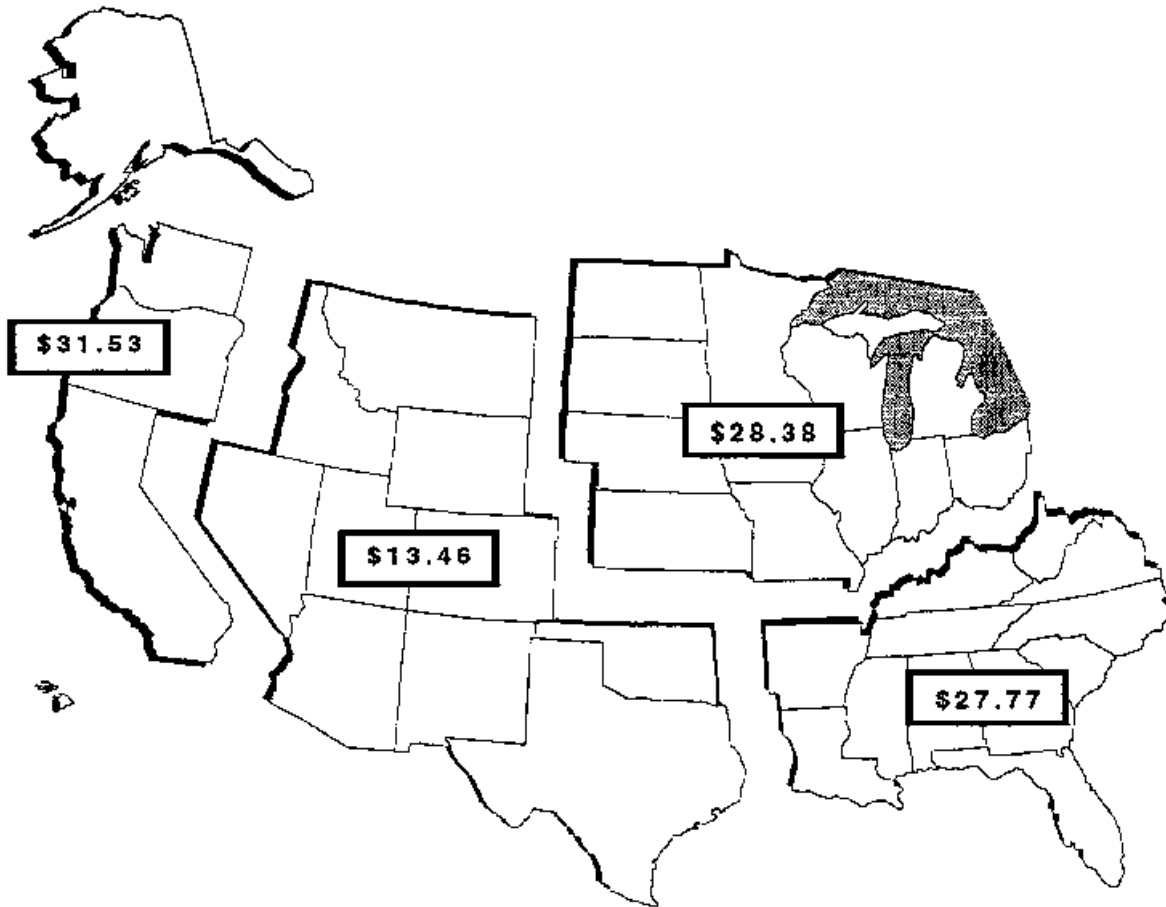


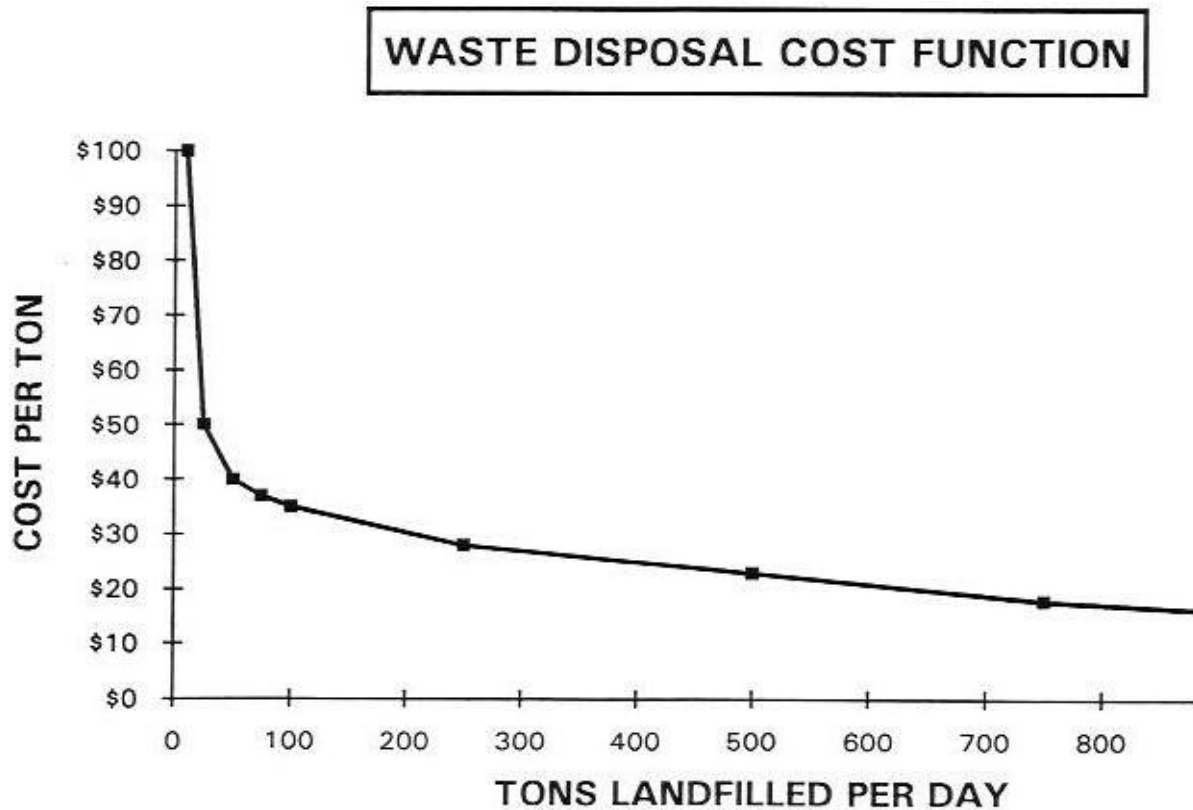
FIGURE 4.1: REGIONAL MSW TIPPING FEES FOR COMMERCIAL HAULER

It is anticipated that disposal costs for all MSW landfills will increase in the near future. The increase is expected to be more dramatic for the small and medium size landfills. There can be a good deal of discussion on such details about when a specific landfill will increase tipping fees and how much the increase will be, but even a quick review of the new federal Subtitle D standards will lead to the conclusion that costs will rise. Compliance with the new standard will require additional operating and capital costs for each landfill. This is particularly true for the smaller landfills.

As each landfill achieves these new standards, an "economy of scale" should become evident. The economy of scale premise reflects that on average (not site specific) larger facilities are cheaper to operate on a per-ton-basis. A significant portion of a landfills cost's are fixed costs including design engineering, site investigations, basic rolling stock, closure costs. This means that costs are absorbed over a greater tonnage of solid waste for the larger landfills and thus result in a smaller disposal cost per ton. The economy of scale is illustrated below.

FIGURE 4.2: WASTE DISPOSAL COST FUNCTION

The graph is provided as a reasonable approximation of the average disposal costs per ton after full



implementation of the new landfill standards. The exact shape and placement of the curve is unknown, but is provided to illustrate the economy-of-scale.

The large increase in disposal cost per ton for facilities disposing under 100 tons per day, is one of the major reasons why approximately 60 of the smaller Utah landfills are expected to close within the next two years. The graph illustrates that as facilities increase in size, the cost per ton declines. This cost advantage is one of the driving forces behind the increased regionalization observed statewide and nationwide.

If the 1992 landfill disposal cost per ton were plotted on the graph, the line would be relatively flat and not reflect the economy of scale. This could be a result of a combination of factors. First, the graphs curved line

represents costs per ton after implementation of the new MSW standards. The new MSW landfill standards do not became effective for the small landfills (under 20 tons per day) until October 1995. In 1992, few if any of Utah's small MSW landfills are incurring the costs associated with full implementation of the new standards. Second, the majority of the smaller landfills budgetary methods do not identify the costs necessary to determine the true cost of operating the landfills.

INCINERATION DISPOSAL COSTS

Currently, the only public MSW incinerator in Utah is the energy recovery incinerator located in Davis County. The *Davis/Morgan County Solid Waste Management Plan* provided cost estimates for the Davis County Solid Waste Management and Energy Recovery Special Service District. The 1992 cost estimates indicate the total operation and capital costs for the district to be \$2,849,000 with a disposal cost of \$50 per ton. These costs are for the operation of the mass burn incinerator and the district's landfill used for the disposal of the incinerator ash and other waste selected to bypass the incineration process.

CHAPTER V

REMAINING DISPOSAL CAPACITY

Over 95% of all the MSW generated in Utah is disposed by landfilling. Even as Utah moves forward on waste reduction and integrated solid waste management systems, it is clear landfilling will remain the predominate disposal alternative.

As Utah's population increases, the need for landfill space increases. However, siting new landfills is increasingly difficult. Although Utah has a large amount of open space, only a small percentage of land is available for the location of new disposal facilities. Within Utah, 78% of the land is either State, Federal, or Indian Lands. Of the remaining 22%, a significant portion is located in an urban environment. These urban areas may have difficulty meeting the siting requirements for a new facility or, for a variety of reasons, may not be well suited for the location of a disposal facility.

The process of locating, permitting, financing, and constructing a new landfill typically requires several years. Any complications along the way may result in lengthy delays. As a result, many communities are in a continual planning process to assure their community and citizens have adequate disposal facilities and capacity for the future.

The county and state solid waste management plans, as mandated by the Legislature, are to determine the amount of solid waste disposal capacity needed for the next 20 years. The county plans provide the annual tonnage of solid waste generated within each county and the remaining disposal capacity at each public and commercial solid waste disposal facility. By comparing each county's solid waste generation rate and remaining disposal capacity at public landfills, a simple estimate of each county's remaining disposal capacity can be provided. These estimates over simplify the solid waste management systems by assuming that all solid waste generated within the county, including municipal, industrial, and construction/demolition waste, is disposed at public landfills in the county. Therefore, the estimate of each county's remaining disposal capacity, as provided in Tables 5.1 and 5.2, is a rough conservative estimate and should be viewed only from a statewide planning perspective. For local planning, individual disposal facilities should be examined. As an example, the estimated remaining disposal capacity for all solid waste generated in Salt Lake County is 22 years, but the remaining disposal capacity for the two public landfills in the county is much greater. The Salt Lake Valley Landfill has an estimated remaining disposal capacity of 27 years and the Trans-Jordon Landfill has an estimated remaining capacity of more than 50 years.

Using this simple estimation technique, the remaining disposal capacity for the entire state is 24 years. The estimate of remaining statewide disposal capacities, in some respect, is a conservative estimate that underestimates remaining capacity. The statewide estimate does not incorporate the following factors.

- Two counties have not determined remaining capacity. When those determination are made, the remaining state disposal capacity will increase.
- In 1992, 471,000 tons of C/D waste representing 17% of the total SW generated in Utah was disposed in six private landfills. If this waste is removed from the remaining capacity calculation, approximately four years of additional statewide capacity is provided.
- East Carbon Development Landfill is a commercial landfill which accepts MSW. It is a large facility with remaining capacity which could theoretically handle all the solid waste generated within the state for over 100 years.
- An additional year of statewide capacity is provided when the 99,000 tons of MSW waste sent to the Davis County Special Service District Burn Plant is removed from the statewide capacity calculation.

With the existing capacity and planned new facilities, it appears Utah does not have a disposal capacity "crisis". However, local public, political, and economic concerns will continue to be issues when trying to open new solid

waste management facilities. These same concerns are involved with decisions to use a regional or commercial facility. As a result, some local areas may experience a solid waste disposal capacity crisis.

County	Municipal Landfill Remaining Capacity (in years)	County	Municipal Landfill Remaining Capacity (in years)
Garfield	50+	Sevier	37
Duchesne	50+	Sanpete	34
Iron	50+	Davis	25
Kane	50+	Cache	24
Millard	50+	Grand	24
Summit	40	Salt Lake	22
San Juan	40	Rich	20
Emery	40	Uintah	20
Washington	40	Juab	20
Utah	39		

TABLE 5.1: Counties with 20+ Years Disposal Capacity

County	Municipal Landfill Remaining Capacity (in years)	Comments
Wayne	2	Regional Landfill Planned
Weber	2	Regional Landfill Planned
Tooele	1	Proposed Composting Facility
Box Elder	1	Regional Landfill Planned
Carbon	0	MSW goes to ECDC Landfill
Morgan	0	Special Service District disposes of MSW in Davis County
Piute	0	MSW goes to John's Valley in Garfield County
Wasatch	0	Waste is sent to Duchesne County Landfill
Beaver	Not Determined	

TABLE: 5.2: Counties with Unknown or less than 20 Years Disposal Capacity

Capacity Source	State Disposal Capacity
EXISTING TOTAL STATE CAPACITY	24 YEARS
Reduction of State SW Tonnage by amount of Private C & D Landfill Waste	4 years
Reduction of State SW Tonnage by amount of MSW going to Davis County Burn Plant	1 year
Additional County Determinations of Remaining Capacity	? years
Commercial MSW Landfills	100+ years
<i>Total</i>	129+ years

TABLE 5.3: Remaining Statewide MSW Disposal Capacity

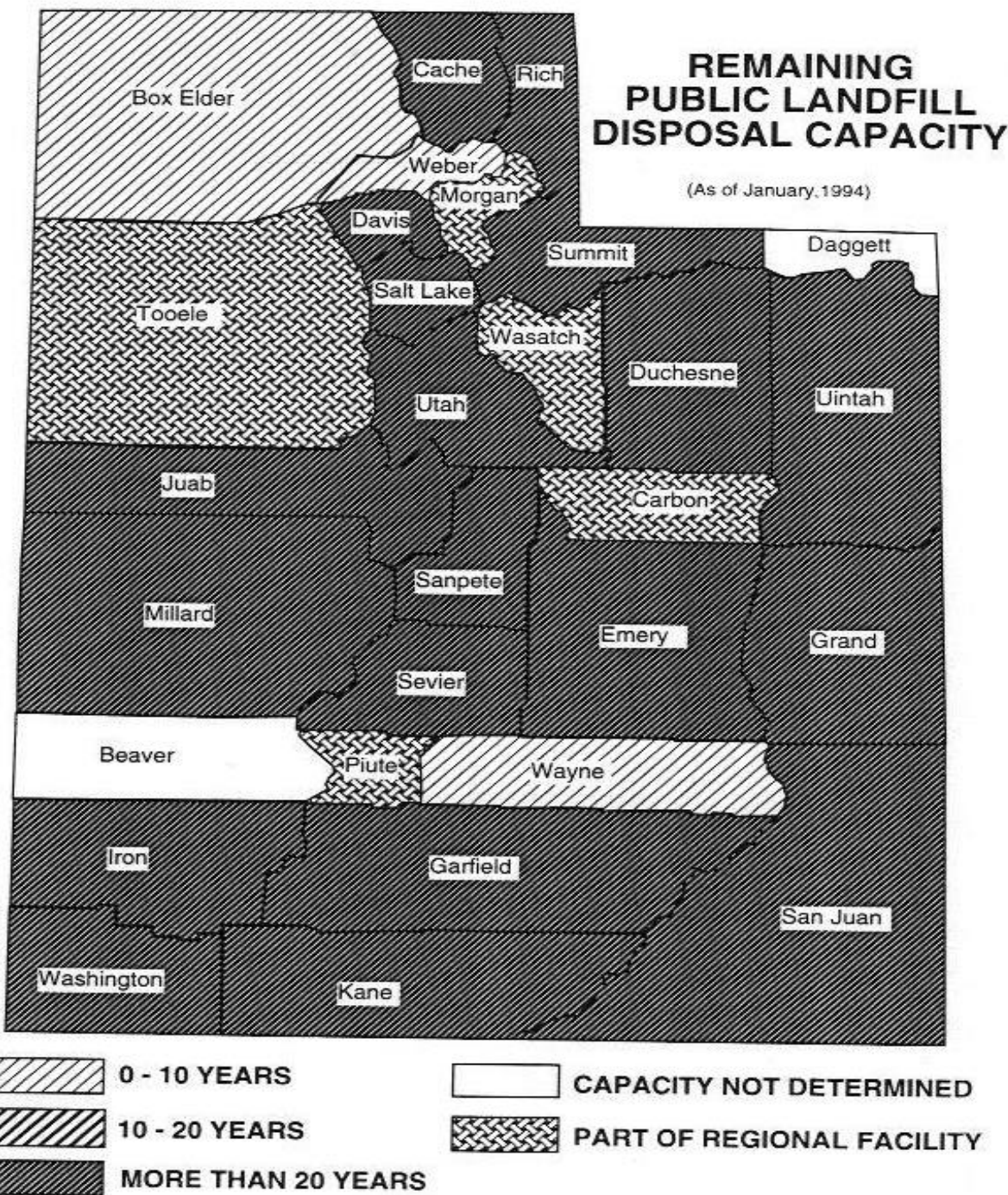


FIGURE 5.1: REMAINING PUBLIC LANDFILL DISPOSAL CAPACITY

CHAPTER VI

COUNTY SOLID WASTE PLANNING RECOMMENDATIONS

Each county plan reviewed a variety of solid waste management options including source reduction, recycling, composting, combustion, landfilling, and increased regionalization as its planning recommendations and goals were developed.

The Legislature mandated that the state solid waste management plan incorporate the plans submitted by counties. Accordingly, the state plan reflects the recommendations and goals provided in the county solid waste management plans.

This chapter provides an overview of the county solid waste planning recommendations and goals. Additionally, a discussion is provided which summarizes how the counties incorporated source reduction, recycling, composting, combustion, landfilling, and increased regionalization into their planning recommendations and goals.

RECOMMENDATIONS SUMMARY

Utah is comprised of 29 counties, each with a unique combination of demographics, local resources, economics, and environmental considerations. As a result, each county plan included a different combination of recommendations and goals to meet its solid waste management needs. However, the following two themes were common among the county recommendations and goals:

- To maximize the cost efficient operation of the solid waste management facilities;
- To achieve compliance with the more stringent environmental protection standards required in the new *Utah Solid Waste Permitting and Management Rules*.

Each county solid waste plan stated, in some way, the desire to assure that the services provided by their waste management system match the needs of the planning area at the lowest possible cost. This concern for cost efficiency was directly addressed in the planning goals of eight counties. The following wording reflects the typical wording for the cost efficiency goal: "The prime goal of the planning effort is to provide cost effective solid waste management options to the residents that will be in compliance with state and federal regulations." The county plans also indirectly established goals for cost efficiencies through the comparisons of different solid waste management options. The low cost options were used as a standard for comparison. Options which were higher in cost than the standard were usually eliminated from consideration.

SOURCE REDUCTION

County Solid Waste Planning Recommendations

Source reduction is the preferred waste management strategy because it prevents generating waste in the first place. Source reduction involves changes in how goods are produced and sold, and changes consumer's behavior. In general, source reduction can be accomplished in four ways:


- By decreasing consumption;
- By reusing products and materials;
- By increasing the durability of products;
- By reducing resources used to develop and market products (especially packaging).

For source reduction to be successful, several obstacles must be recognized. First, source reduction is difficult to measure. Accurate measurement of the solid waste generated must be conducted prior to any attempted measurement of the source reduction accomplishments. Solid waste generation rates are the result of prevailing attitudes and habits of individuals, households, businesses, and government. To change consumer's attitudes and habits will require waste reduction to become part of everyday life. Many of the county solid waste management plans recognized these challenges when selecting strategies to reduce the amount of waste generated.

Several counties acknowledged that the results of source reduction activities are difficult to measure and declared locally initiated source reduction activities would have limited impact. Four counties established a quantifiable goal to reduce the amount of solid waste entering their landfills. Three counties set the goal of a 25% reduction in the waste disposed through the combination of waste reduction, recycling, and composting. One county established the long term goal of maintaining the 1992 amount of waste destined to the county landfill. Another county established the goal of annually collecting accurate solid waste tonnage generation and disposal information to facilitate future planning. Accurate waste generation information will help identify and quantify where source reduction activities will be most effective.

Many county plans declared that, at a local level, they could not significantly affect the product design, packaging laws, or extended warranty programs, but acknowledged that they could take measures to reduce the amount of waste generated. The most popular strategy to address source reduction was public education. Public education was the primary tool for 14 counties to reduce the amount of waste generated. These plans also encouraged local governments to reduce the amount of waste generated.

RECYCLING

During the past decade, recycling has received a lot of recognition as a method to save energy and natural resources, conserve limited landfill space, provide useful products from discarded materials, and even make a profit. As a marketing tool, many product labels contain the recycle symbol  which is easily recognized by most consumers. The nationwide popularity of recycling is evident in Table 6.1 by the increasing volumes of materials recycled.

In some cases, the amounts of materials being collected for recycling exceeded demand and has resulted in unstable markets for some materials. In short, recycling has become and will continue to be increasingly popular with the general public. Solid waste managers will continue to examine recycling options in their attempts to battle costs and develop an integrated solid waste management system.

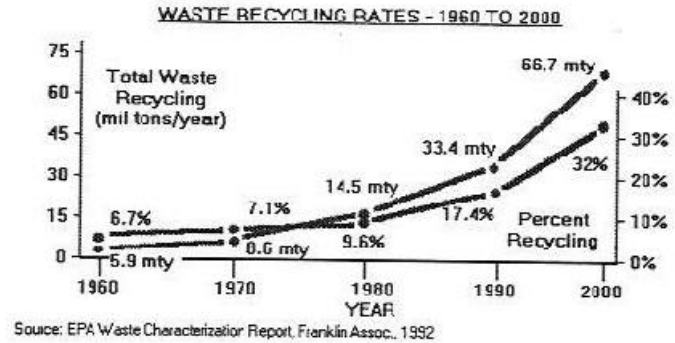


FIGURE 6.1: Waste Recycling Rates - 1960 to 2000

The county solid waste management plans identified 49 recycling facilities located in 14 counties. The facilities accounted for 482,609 tons of recycled materials for a statewide recycling rate of 18%. As indicated in Table 3.11, the vast majority (97%) of the materials recycled occurred in the three urban counties of Salt Lake, Utah, and Weber. These three counties had recycling rates between 20% and 30% in 1992. With the exception of Sanpete County, with a successful private ferrous metals recycling operation, the remaining 25 counties have a recycle rate of less than 10% and contributed approximately 3% of the total materials recycled statewide.

To obtain an overview of the recycling activities across the state, it is useful to create general categories to describe each county's recycling strategy. Those recycling categories reflect the county's recycling strategies. The recycling categories are: active, moderate, and limited. An overview discussion of the counties recycling activities within those categories is provided.

Recycling Strategy	# of Counties
Active	4
Moderate	15
Limited	10
Totals	29

TABLE 6.1: Recycling Strategy Categories

Active Recycling Strategies

Active recycling strategies are typified by having:

- Specific recycling goals or targets with measuring techniques to determine recycling accomplishments;
- Specific budgets for recycling programs;
- Techniques to accurately measure the different solid waste stream components;
- Significant percentages of the solid waste stream being recycled;

- Established public education programs;
- Established residential recycling programs including limited curbside recycling programs.

The counties of Salt Lake, Utah, Weber, and Cache are best characterized as having active recycling programs. The counties have common themes and strategies to increase the amount of materials recycled. These common themes include public education, market development, and increased collection of recyclable materials. Since a significant portion of the state's recycling activity is concentrated in these counties, a brief review of each county's recycling strategies, goals, and objectives is provided.

The Salt Lake County planning area has benefited from a very active public education program conducted through the Salt Lake County Recycling Information Office. This office receives funding through the Salt Lake Valley Landfill tipping fees and is staffed by a recycling coordinator and volunteers. The office provides a wide variety of information and material including press releases, "how-to" brochures, legislative involvement information, videos, journals, books, and fact sheets. The Recycling Information Office will be increasing its public education efforts in order to reach the goal to reuse or divert as much waste from landfilling as feasible. These efforts are primarily focused on the municipal waste stream and include:

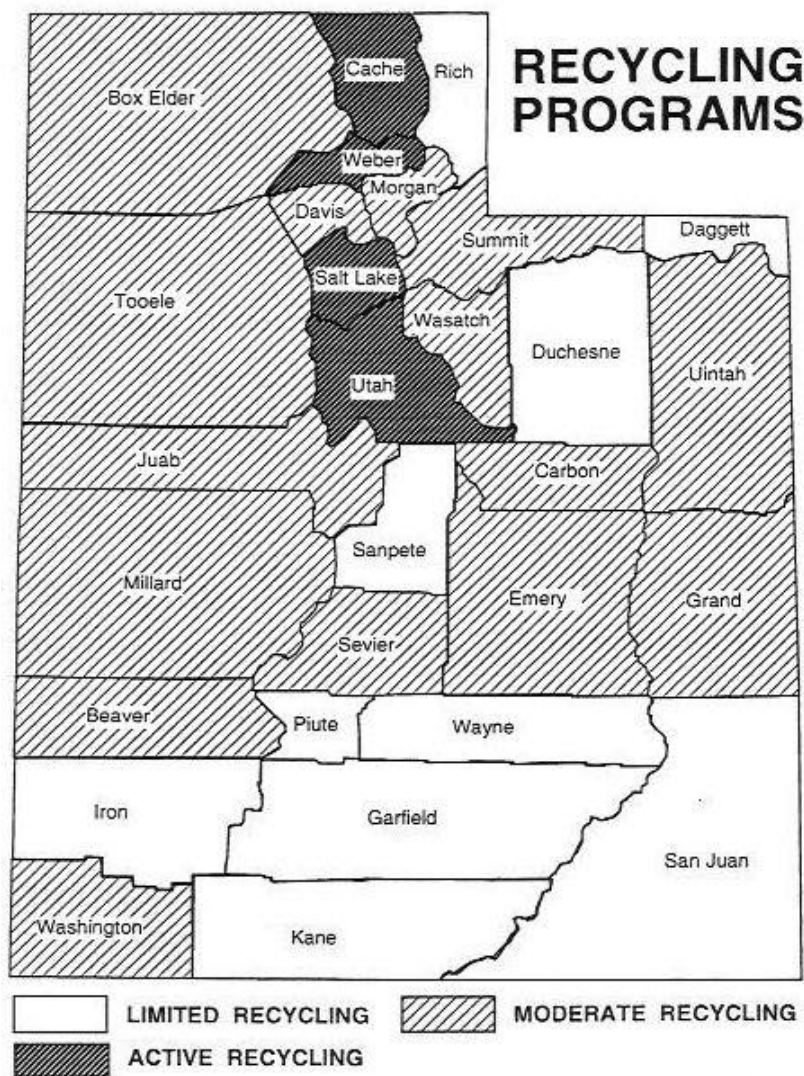


Figure 6.2: Recycling Programs Map

Chapter VI

- Establishing a network to provide education and information to local officials involved with solid waste decision making;
- Continued collection of information and data regarding the various diversion programs throughout Salt Lake County;
- Establishing school curriculums;
- Monitoring resource recovery and diversion accomplishments.

The *Salt Lake County Solid Waste Management Plan* includes four facility-based scenarios to serve as a starting point to develop a consensus on the solid waste management needs of the county. The recycling strategy within each scenario is discussed below:

- Scenario I is maintaining the Status Quo;
- Scenario II involves the development of "Blue Bag" collection of 50 TPD of recycled materials which will be delivered to a private materials recovery facility (MRF);
- Scenario III involves the development of a public transfer station which will be capable of recovering 50 TPD of "Blue Bag" recycling program to be sent to a private MRF;
- Scenario IV involves the development of a public transfer station and a county owned/operated MRF.

The *Utah County Solid Waste Management Plan* recognizes that recycling is a closed loop process. Consequently, the recycling efforts in Utah County will focus on collection of materials for which there is a market with economical rewards. Public education will be used to identify the types of materials that can be economically recycled and the recycling methods in Utah County.

The Utah County Plan includes the goal of forming a common coordinating group to provide public education. This coordinating group will provide continuous public education on recycling and solid waste management issues. Specifically, the group will:

- Develop and distribute educational materials such as pamphlets, fact sheets, and group presentations for community groups and the general public;
- Develop an outreach program to area schools;
- Increase utilization and expansion of existing residential, curbside, business, and drop-off recycling activities for marketable materials. In addition, the Utah County plan established the goal of encouraging all governmental agencies to purchase recycled paper for 5% of their copy needs and to support legislation to enhance markets for recycled products.

Weber County Solid Waste Management Plan has no mandated recycling program and states that recycling is primarily the function of commercial sector searching for economic gains. The Weber County Plan includes a goal of increasing voluntary recycling tonnage from 173 tons in 1993 to 1384 tons in 2002. To help reach

County Solid Waste Planning Recommendations

this recycling goal, a public education campaign will be initiated through newspaper advertisements, public speaking forums, and Earth Day activities. Ogden City began a voluntary curbside recycling program in 1993 with 500 subscribers.

The *Cache County Solid Waste Management Plan* contains specific recycling goals and a detailed strategy to reach those goals. The primary recycling goal is to increase the residential solid waste stream recycling rate to 10% and the industrial solid waste stream recycling rate to 14.65%. The objective is to obtain the residential recycling goal by the year 2004 and the industrial recycling goal by the year 2012. In addition, the county plans calls for expansion of the existing recycling program through the public education program and greater coordination and cooperation with private industry. Consistent with public support, a recycling plan, marketing plan, collection plan, and budgetary responsibility plan will be developed. The plan also states the implementation of a recycling program shall not increase the overall cost of solid waste disposal.

Moderate Recycling

In addition to the recycling programs previously described, fifteen counties are supportive of recycling but have additional obstacles to overcome in the development of successful recycling programs. Typically, these counties have lower recycling rates due to the less attractive recycling economics within their planning areas. These counties can be characterized as:

- Less densely populated which resulted in increased per capita collection costs for route collection vehicles;
- Greater hauling distances to recycling markets;
- Smaller industrial base which typically contribute significant amounts of recyclable materials;
- Fewer established residential recycling programs;
- Less accurate measures to monitor the solid waste stream and amount of materials recycled.

Regardless of the additional obstacles, these 15 counties have moderate recycling programs and are supportive of recycling activities. Three of these counties have established recycling goals. Box Elder, Sevier, and Washington County have set the goal to reduce the amount of solid waste going to the landfill by 25% through a combination of waste reduction, recycling, and composting. These counties estimate that between 5% and 10% of all the waste going to the landfill can be recycled. Grand County, through an established community based (not-for-profit) recycling group that receives partial funding from the county, successfully recycles a variety of materials. Within Davis County, the City of Bountiful offers voluntary curbside recycling. All 15 counties rely on public education as the key to their recycling activities. Many of these counties declare that additional recycling services will be provided when public demand is sufficient.

Limited Recycling

Chapter VI

The remaining ten counties can be characterized as having limited recycling. These counties have a small population base and even greater obstacles to overcome than those counties with moderate recycling activities. These rural areas have a small industrial base, greater hauling distances, and no established recycling programs.

These ten county plans will use public education as the tool to inform the citizenry of the benefits of recycling. However, each county plan declares there is little or no economically viable recycling market and little effort will be placed on recycling until the market develops or improves. Additionally, six counties declared their opposition to federal and state mandates regarding minimum recycling rates or waste disposal bans.

COMPOSTING

Composting is the aerobic, microbial degradation of organic waste which can produce a humus-like product that may be used as a soil amendment. Municipal solid waste contains large amounts of organic waste such as paper, cardboard, food waste, and yard waste. It is estimated that up to 84% of the nations municipal solid waste is compostable with yard waste alone representing 18% of the municipal waste stream.

Many of the landfill operations are examining alternatives to conserve valuable landfill space and control escalating costs. The county plans reveal that removing yard waste or green waste from the waste stream is the most cost efficient method to reduce the volume of waste being landfilled. Two methods are being utilized to prevent landfilling of green waste. The first method is to develop a composting operation. The second method is to utilize less costly green waste disposal options, or ban green and yard waste from the landfills.

The county plans identified five composting facilities in operation during 1992, as identified in Table 3.8. By 1994, at least three additional composting operations were in operation with seven other counties planning to establish composting operations in the near future. Generally, these composting facilities are being located and operated in conjunction with large municipal landfills. Because of the significant capital and operating costs, large composting operations are needed to benefit from economics-of-scale.

The three composting operations that recently came on-line include facilities operated in conjunction with the Trans-Jordan Landfill, the Salt Lake Valley Landfill, and a private composting operation in Box Elder County.

The plans indicate that serious consideration is being given to developing public composting operations in Carbon, Davis, Summit, Tooele, Utah, and Weber Counties. The proposed Tooele County composting operation will divert the greatest percentage of the solid waste stream from disposal. The *Tooele County Solid Waste Plan* estimates that as much as 90% of the municipal waste stream will be composted or recycled with the remaining waste being transferred off-site for disposal. The other county plans primarily target only green or yard waste for their planned composting operations.

County Solid Waste Planning Recommendations

Many of the counties with smaller urban populations are closing small community landfills and will be transporting the waste to landfills located further away. In an attempt to reduce the transportation costs, these counties are examining ways to reduce the amount of waste to be transported and disposed. Several counties have determined, that under existing conditions, composting costs are not competitive with landfill disposal costs but will continue to periodically examine composting as an option.

Bans or prohibition on landfilling of green or yard waste is being considered by four counties; Sevier, Summit, Uintah and Washington Counties. These counties are also planning to utilize public education to encourage home composting and mulching to divert yard waste from disposal.

Green Waste Management Alternatives	# of Counties
Current Composting Facilities	4
Planned Composting Operations	5
Considering Bans or Prohibitions	4
Totals	13

TABLE 6.2: Green Waste Recycling Strategies

LANDFILLING

The greatest change to the solid waste management systems across the state is a direct result of the new federal Subtitle D standards which impact all landfills receiving municipal solid waste. To obtain state authorization, Utah developed solid waste management rules equivalent to the federal regulations. The *Utah Solid Waste Permitting and Management Rules* became effective July 15, 1993.

Most counties spent significant planning effort examining their existing landfills to determine the impact of the new landfill standards. These examinations revealed that many existing municipal solid waste landfills will have difficulty meeting the new standards because of landfill location or costs associated with operating the landfill within the new standards. Small municipal solid waste landfills, in particular, will experience a significant cost increase because they lack economics-of-scale.

Most county evaluations of existing landfills were conducted from a planning perspective. The county solid waste management plans are not technical documents with specific or detailed solutions to solid waste disposal problems. Rather, the plans typically identify landfills that are recommended for closure. Due to the extensive work required to build new landfills or to form regional partnership, few of the county plans have selected a solid waste management solution for replacement of landfills targeted for closure.

The county plans identified approximately 65 landfills located in 20 counties that are targeted for closure prior to the effective dates of the new landfill rules. As illustrated in Table 6.3 below, the vast majority of landfills to be closed dispose of less than 20 tons per day.

Chapter VI

Landfill Size (in tons per day)	# of MSW Landfills	# of MSW Landfills Closing	% of MSW Landfills Closing
0-20 (Small)	72	59	81%
20-100 (Medium)	12	5	42%
100 + (Large)	9	1	11%
Total	93	65	70%

TABLE 6.3: Anticipated MSW Landfill Closures

As a result of the new landfill standards and consequent closing of many of the municipal solid waste landfills, many rural counties are in a transition from small to more regional municipal solid waste landfills. For small landfills, the general effective date of the new landfill rules is October 9, 1995.

Although the solution or alternative solid waste management system to follow the closure of the existing landfills has not been finalized, several strategies are developing. One strategy is to close the existing landfill and provide a replacement landfill in the same vicinity. Typically, the costs of landfill closure and post closure care is less under the rules prior to the effective date of the new standards. Thus, the long term disposal costs may be reduced by closing a landfill under the less stringent rules and providing a new landfill which is permitted, designed, constructed, and operated to meet the new landfill standards.

Another strategy chosen by many communities and counties is the planned closure of existing landfills and entering into a cooperative agreement to dispose of their solid waste at a more distant "regional" landfill. Typically, once the decision to close the landfill has been made and a disposal agreement at a regional landfill has been completed, the planning areas evaluated options to reduce the solid waste transportation costs. (At the time the county plans were completed, few of the cooperative disposal agreements with regional landfills had been completed.)

County Solid Waste Planning Recommendations

To provide a cost efficient transportation system, some planning areas implemented mandatory curbside collection and required the solid waste collection service to be responsible for transporting compacted loads to the regional landfill. Other planning areas may provide transfer stations or drop box facilities near the closed landfills so the waste originally going to the closed landfill can be economically transported to the regional landfills. Drop box facilities utilize large detachable containers or dumpsters for collection of solid waste generated off-site. Drop boxes normally serve the general public who self haul uncompacted loads of solid waste. Transfer stations are facilities used by persons and/or route collection vehicles to deposit collected solid waste from off-site into a larger transfer container for transporting solid waste to a solid waste handling or disposal facility.

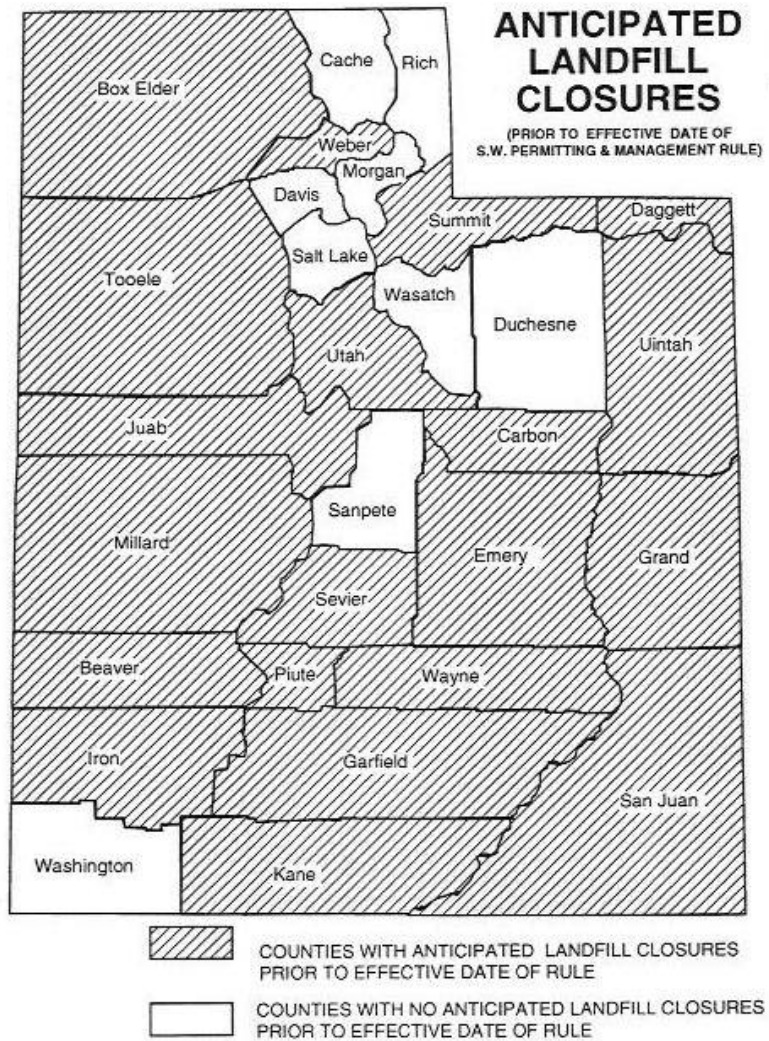


Figure 6.3: Anticipated Landfill Closures Map

Additionally, planning areas are examining methods to reduce the volume of solid waste that must be transported to the regional landfill. One method

to reduce the transportation cost is to develop an alternative disposal site to accept the heavy or bulky waste which is expensive to transport. Several county plans consider the development of Class IV landfills which are permitted to dispose of construction/demolition waste, yard waste, and inert waste.

In summary, Utah is in the transition from the operation of many small community landfills to the management of solid waste through the development of regional landfills and the expansion of alternative disposal and transportation methods. The formation of cooperative agreements among various governmental units is continuing to evolve.

CHAPTER VII

STATE SOLID WASTE MANAGEMENT STRATEGY

The county solid waste management plans clearly illustrate that solid waste management in Utah is currently undergoing a major transformation. The primary catalyst for this transformation is the new solid waste management rules which became effective on July 15, 1993. For small landfills serving an average populations of 10,000 or less, these rules become effective on October 9, 1995.

The increased environmental and public health protection, provided by the rules, has also increased solid waste management costs. Solid waste managers in both urban and rural areas are currently examining and selecting solid waste management options that will provide the framework for future solid waste management systems. All solid waste managers share the objective of providing the most cost effective solutions while meeting the new environment and public health standards. The options being examined by solid waste managers are considerably different for rural and urban areas.

Typically, rural area solid waste management systems rely on small landfills located near small municipalities. Following is just a few of the questions rural solid waste managers must answer as they examine system options and alternatives:

- What is the true cost of operating the existing solid waste collection system and/or landfill?
- How much will it cost to operate the existing landfill in compliance with the new rules?
- Should the existing landfill be closed?
- Should a new landfill be built or should a cooperative agreement be established with another landfill?
- What will be the source of revenue to cover the new landfill costs?
- What are the public's concerns and desires relating to solid waste management?
- What is the best way to communicate and inform the public of the solid waste issues?

Urban areas may have several advantages to help meet the new solid waste management rules. Urban landfills typically have significant in-house technical expertise and began their facility upgrading several years in advance of finalization of the new rules. Additionally, urban landfills have a greater revenue base and economies-of-scale to help off-set any increases in the cost of operation.

Urban areas are also going through a transformation of their solid waste management systems. Solid waste managers are challenged by having to meet the new landfill standards, reduce the cost of operation, conserve landfill space, and provide the level of service desired by the public. To meet these challenges urban solid waste managers are examining a broad range of options and alternatives to develop more integrated solid waste management systems.

Chapter VI

Urban areas generate large quantities of solid waste which consume large amounts of limited landfill disposal capacity. To accommodate this volume of waste, urban landfills and supportive facilities may be hundreds of acres in size. Siting a new landfill of such size in an urban area is increasingly difficult if not impossible. Accordingly, urban solid waste managers are increasingly dedicated to conserving existing landfill disposal capacity through waste reduction, recycling, and composting. Landfill managers are also designing alternative facilities to manage large volume solid waste which pose limited environmental concerns.

Public support and desire for integrated solid waste management is growing and services are being expanded to meet that desire. Increased opportunities for public recycling are being provided through the development of recycling facilities at landfills, curbside collection of recyclables, and composting operations. Landfill managers are also striving for increased efficiency to contain the increased operating costs as a result of new environmental regulations and requests for increased services.

Like the rural and urban solid waste systems managers, the function of the Solid Waste Section of the Utah Division of Solid and Hazardous Waste is in transition as the result of the new *Solid Waste Permitting and Management Rules*. These new rules:

- Requires a new permit for every landfill receiving waste from off-site sources;
- Requires every landfill receiving waste from off-site sources to submit an annual report;
- Expanded regulatory oversight to include:
 - Recycling facilities;
 - Composting facilities;
 - Facilities using organic materials from off-site as soil amendments;
 - Transfer stations;
 - Waste tire pile;
 - Infectious waste generators, transporters, and infectious waste storage, treatment, and disposal facilities.

Additionally, the Division will propose new rules to provide regulatory oversight of industrial facilities disposing of solid waste on-site and to require the registration of waste tire transporters and recyclers.

In summary, both rural and urban solid waste management systems are in a period of transition which will require significant changes to their operations. The Solid Waste Section of the Utah Division of Solid and Hazardous Waste is also undergoing significant changes to its oversight role and function. Accordingly, the primary focus of the state solid waste management plan during the next five year planning period is to aid local and state agencies, the public, and solid waste system managers and operators during this transition period while continuing to protect public health and the environment. The following goals and measures reflect that focus.

SOLID WASTE MANAGEMENT STRATEGIES

One of the most significant challenges facing community leaders and landfill operators is the upgrading of their operations to obtain compliance with the new standards prescribed in the *Utah Solid Waste Permitting and*

County Solid Waste Planning Recommendations

Management Rules. Meeting the new standards is more than simply reading the "rules" and making a few operational changes. In many cases, meeting the new standards will require extensive operational changes, employee training, development of detailed record keeping procedures, increased efficiencies to minimize cost increases, modifying the public's solid waste disposal habits and perceptions, closing old sites, and technical assistance to complete the permitting process for new or existing sites.

The Division of Solid and Hazardous Waste will concentrate its solid waste management efforts in helping solid waste managers meet these new challenges. The Division's efforts will be implemented as a partnership with the public and the regulated community that balances environmental protection, public health, and economic factors. The Division will strive to provide local technical training to landfill operators and will promote and assist other organizations in the delivery of technical training. The Division will expand its function as a disseminator and resource of solid waste management information.

Goal #1: To uniformly implement and achieve compliance with the *Utah Solid Waste Permitting and Management Rules* by assisting local governments in the development of solid waste solutions through training, education, and regulatory oversight.

Measures:

- Number of Division sponsored, co-sponsored, or participated training sessions for solid waste managers or operators;
- Number of facilities permitted per year;
- Percent of operating facilities with current permits;
- Number of inspections conducted per year;
- Number of violations found per facility.

One of the legislative objectives of the State and the County Solid Waste Management Plans is to determine the type and quantity of solid waste generated within the state. The County Plans revealed that solid waste transporters or disposal operations almost exclusively use weight as their single measure of the waste stream. Components of the municipal solid waste stream, in general, may be similar from county to county and state to state. However, that is not expected to be true of the industrial solid waste stream. As a result, the County Solid Waste Management Plans were unable to accurately quantify or characterize the industrial waste generated within the state.

Industrial solid waste, as defined in the *Utah Solid Waste Permitting and Management Rules*, is any solid waste generated by manufacturing or other industrial process that is not a hazardous waste and does not include mining waste or oil and gas waste. Industrial solid waste may exhibit a wide range of characteristics. Industrial solid

Chapter VI

waste may be essentially inert material or may contain harmful constituents, that when improperly managed, may cause serious environmental damage. Based on national and other state's statistics, it is likely that the actual quantity of industrial waste generated may significantly exceed the amount of municipal solid waste generated within Utah.

However, the *Utah Solid Waste Permitting and Management Rules* do not apply to industrial waste disposal facilities that receive industrial solid waste generated on-site. Although the county plans were not required to include an inventory of on-site industrial landfills, the eight landfills were identified that receive only industrial waste generated on-site. It is conjectured that several additional on-site industrial solid waste landfills exist within the state. With the concern for the environment and public health, the Division of Solid and Hazardous Waste will address the need for regulatory oversight associated with on-site disposal of industrial waste.

Goal #2: To establish a regulatory framework, in cooperation with industry and the public, that ensures on-site disposal of industrial solid waste is conducted in a manner that protects the environment and public health.

Measures:

- Number of public meetings and industrial group coordination meetings;
- Completion of draft rules to address on-site disposal of industrial waste.

WASTE REDUCTION STRATEGIES

Environmental and public health protection is more than the proper management and control of the waste stream. Prevention of pollution is maximized by reducing the amounts of waste generated and recycling the waste that is generated. In 1991, the Department of Environmental Quality established a pollution prevention program. The program focuses on public education, technical training, and improved coordination and communication among the various groups concerned with pollution prevention. In 1993, the Legislature passed the *Used Oil Amendment Act* which gave the Division of Solid and Hazardous Waste the responsibility to promote recycling of used oil while protecting human health and the environment. The state solid waste management plan recognizes the importance of waste minimization and recycling.

Goal #3: To increase the voluntary opportunity to recycle and increase the amount of waste recycled.

Measures:

- Tonnage of solid waste recycled;
- Per capita amount of waste recycled;

- Number of community sponsored recycling programs;
- Gallons of used oil recycled;
- Percentage of new oil recycled;
- Number of used oil recycling drop-off centers.

Goal #4: To minimize the amount of solid waste generated.

Measures:

- Tonnage of solid waste disposed;
- Per capita amount of solid waste disposed.

FULL COST ACCOUNTING

As municipal solid waste management systems expand and become more integrated, their financing and accounting systems become more complex. Financing mechanisms for municipal solid waste systems may include a combination of taxes, user fees, service fees, revenue from recycled materials, and other sources. Solid waste management system costs may originate from a variety of facilities such as landfills, transfer stations, collection systems, composting operations, and others. For each facility, costs may occur from a number of categories including site selection costs, planning costs, capital costs, annual operating costs, closure costs, and post closure costs.

To make sound management decisions, local governments and solid waste managers need to have ready access to accurate and complete cost data. However, the County Solid Waste Management Plans indicate that many local government accounting practices do not reflect the full cost of owning or managing their solid waste management system. The need for full cost accounting is essential as municipal solid waste systems make long range planning decisions.

Goal #5: To assist local governments and solid waste operators to develop procedures that accurately reflect the full cost of managing their solid waste systems.

Measures:

- Number of Division sponsored, co-sponsored, or participated training sessions which provide solid waste management full cost accounting principals;
- Number of municipal landfill owners and operators qualified under the financial test as demonstration of financial assurance for the cost of closure, post-closure

Chapter VI

care, and corrective action for known releases.